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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/759,838	**Applicant(s)** TOMOFUJI ET AL.	
	Examiner LI LIU	**Art Unit** 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/21/2008*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/18/2008 has been entered.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 11/21/2008 is being considered by the examiner.

Response to Arguments

3. Applicant's arguments filed on 11/18/2008 have been fully considered but they are not persuasive.

1). Applicant's argument - "Bergano describe passively splitting multiplexed signals to respective "N distinct bands" with center wavelengths $\lambda 1$ .. λN for respective dispersion compensation. In other words, Bergano itself already describes a technique for splitting signals for dispersion compensation, and the alternative parameters--e.g., bit rate--for "switching" demultiplexed wavelengths described in Tomofuii et al. (I) are incongruous with the technique described in Bergano".

Examiner's response - Bergano teaches to demultiplexes the input multiplexed signal so as to output the demultiplexed wavelengths (each wavelength band has a specific center wavelength) to respective output ports; and Bergano teaches a plurality of dispersion compensation units which are connected to the respective output ports, and have respective, different dispersion values. But, in Bergano's system, the wavelength router (303 in Figure 3) or splitter (203 in Figure 2) is a "passive-like" device, not an "active" switch that can be controlled. That is, for a specific wavelength or wavelength band, it will be always routed to a specific dispersion compensator.

In Tomofuji's system, each channel has different wavelength and specific bit rate (40 Gb/s or 10Gb/s etc.). The demultiplexer 10 is a <u>wavelength</u> selection element that demultiplexes input signal light <u>in accordance with wavelength</u>. And Tomofuji clearly discloses that in each of the optical switches 11-1 to 11-2m, light sent to the input port from the demultiplexer 10 is output from one output port set in advance according to the wavelength arrangement of optical signals. The switching operation of each of the optical switches 11-1 to 11-2m is set according to the wavelength arrangement of the optical signals Ch1 to Chx as shown in the middle part of FIG. 2. As shown in Figures 1 and 2, Ch 1 is outputted from 12-1 and Ch 2 is outputted from 12-2 etc. And each channel has different wavelength. And Tomofuji teaches that the control circuit recognizes the bit rate, <u>wavelength arrangement</u> and the like of each optical signal based on the transmission information from the optical senders, and according to the results, controls the switching operations of the optical switches 11-1 to 11-2m so as to ensure required bandwidth corresponding to each bit rate. That is, the switch is

according to the wavelength, and also based on the bit rate to ensure required bandwidth. Even though the switching is also according to the bit rate, the data signal with the specific bit rate must be transmitted or modulated on a specific wavelength; and the switching router actually routes the wavelength channels to specific output ports. The switch can not route the “bit rate”, the switch can only route the wavelength that carries signal. That is, Tomofuji et al teaches an "active" switching routing that switches channels to different output ports, and the switching is controlled by a controller.

By applying the "active" switching router as taught by Konishi and Tomofuji et al to the system of Bergano, the demulitplexed channels can be sent to any one of the dispersion compensation units. It is well known that the total dispersion value of a channel depends on the transmission distance (each channel may be added or dropped at different add/drop node), bit rate and wavelength used. Therefore, each channel may have different total dispersion value (or some channels may have similar total dispersion values); by the "active" switching, the individual channel can be sent to a specific dispersion compensating device that matches the total dispersion value of the individual channel. And also, all the demultiplexed channels can be compensated by the respective dispersion compensators at the same time. Therefore, it is obvious to one skilled in the art to combine Konishi and Tomofuji et al with Bergano so that a flexible dispersion compensation can be performed according to various dispersion characteristics of each channel, and the dispersion of each individual channel can be precisely and efficiently compensated by optimally choosing one of the plurality of dispersion compensating devices.

2). Applicant's argument – “Bergano, as cited and relied upon by the Examiner--and correspondingly, the proposed combination of references--only describes dispersion compensation for respective wavebands. For example, Fig. 5 of Bergano illustrates signals from "wavelength routing device 503" being separated signals into two wavebands, low band and high band, for respective dispersion compensation through fibers 504 and 505. Please see col. 5, lines 29-55 of Bergano. And the remaining disclosure of Bergano consistently describes embodiments of dispersion compensation for an N number of output bands”. “Applicants, again, respectfully submit that the cited disclosure from Bergano describe an alternative technique for dispersion compensation by N wavebands, and, therefore, does not provide any motivation, suggestion, or objective reason to be altered and combined with Konishi and Tomofuji et al. (I) to meet the claimed wavelength features absent improper hindsight from the claimed invention itself”.

Examiner's response - As disclosed by Bergano, a wavelength router (e.g., 303 in Figure 3) is used to demultiplex the incoming signals into N distinct output bands, each band has a center wavelength, e.g., center wavelengths $\lambda 1$ .. λN; and then each wavelength band is inputted to a respective dispersion compensation fiber (e.g., 304 in Figure 3), and each dispersion compensation fiber has respective different dispersion values (column 4 line 20-26). Figure 5 is just one of the embodiments disclosed by Bergano. As shown in Figure 3, the wavelength router 303 demultiplexes the input signal into N wavelength bands, each has a center wavelength. Bergano does not state that each demultiplexed band must have two or more wavelength channels. And the

number of channels in the wavelength band depends on the wavelength router and the channel spacing of the input channels. When the "band" has only one wavelength channel, the routing of the wavelength "band" is same as to route each of the demultiplexed wavelength. Even if the band has two or more wavelength channels, Bergano still teaches to use the wavelength router to route the wavelength channels according to the wavelengths, and each dispersion compensator compensates dispersions of different wavelenth channels. That is, Bergano teaches the scheme to compensate the dispersion by different dispersion compensators based on the wavelengths.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in

the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

As discussed in section 1) above, Bergano teaches a “passive” routing so to send different wavelength channels to respective dispersion compensators; and Konishi teaches an active switching, and Tomofuji et al further discloses an active switching for WDM signals and that the wavelength channels can be convenienty directed to respective dispersion compensators, and the dispersions of each wavelength channel can be compensated by an optimally chosen dispersion compensator. That is, the combination of Bergano, Konishi, and Tomofuji et al teaches a system and method that can be used to optimally chose a dispersion compensator for a wavelength channel traveling different fiber or distance; therefore, it is obvious to one skilled in the art to combine Konishi and Tomofuji et al with Bergano so that an “active” switching routing can be performed for each channel, and the dispersion of each individual channel can be precisely and efficiently compensated by optimally choosing one of the plurality of dispersion compensating devices.

Specification

4. The disclosure is objected to because of the following informalities: the cross reference, listed in lines 15-19 of page 21, should be moved to the first page before the BACKGROUND OF THE INVENTION, and under a section heading <u>CROSS-REFERENCE TO RELATED APPLICATION</u>.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3-5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergano (US 6,137,604) in view of Konishi (US 2001/0048540) and Tomofuji et al (WO 02/30026; note: the corresponding English translation of WO 02/20026 can be found in US 2003/0215233).

1). With regard to claim 1, Bergano discloses an apparatus (Figure 3) for compensating for dispersion, comprising:

a wavelength-selective optical routing unit (Wavelength Router 303 in Figure 3) which receives at one input port thereof a signal into which a plurality of wavelengths are multiplexed (column 3, line 12-14, WDM optical carriers each carrying an SDH signal; Figure 4 shows the wavelengths), and demultiplexes the signal so as to output each of the demultiplexed wavelengths at respective desired output ports (Figure 3 shows 1, 2, 3, ... N output ports; each of the demultiplexed wavelengths is outputted to the respective desired output port: one of the output ports that connected to the compensation fibers 304_1-304_N) while routes of the demultiplexed wavelengths leading to the output ports (Figure 3, column 5 line 6-14);

a plurality of dispersion compensation units (dispersion compensation equalizing fiber 304_1, 304_2, 304_3, ..., 304_N, in Figure 3) which are connected to the respective output ports, and have respective, different dispersion values (column 4 line 20-26); and

a multiplexing unit (Wavelength router 305 in Figure 3) which receives at a plurality of input ports thereof the demultiplexed wavelengths output from said dispersion compensation units, and multiplexes the demultiplexed wavelengths to generate a signal (emerging on fiber 306 in Figure 3, column 5 line 1-14).

In Figure 3, Bergano discloses wavelength router. But, Bergano does not expressly disclose a wavelength-selective optical switching route and switching routes of the demultiplexed wavelengths leading to the output ports; and wherein at least one of the dispersion values for a respective one of the demultiplexed wavelengths is set to an optimal value in accordance with a transmission path length at a time a transmission path is switched for the respective demultiplexed wavelength.

However, using switching routing so that one wavelength band can be switch to any one of dispersion compensating elements specific is well known in the art. Konishi teaches a system and method (Figures 2 and 3) in which a plurality of dispersion compensators are used to compensate for various degrees of waveform distortion due to dispersion distortion in the optical transmission line by having different dispersion compensating characteristics, and a selection switch selects one of the dispersion compensators and connects the output with the selected dispersion compensator; so if the optical transmission line is changed, the dispersion compensating means such as DCF in the optical transmitting device will not have to be changed.

And Konishi discloses "[t]o the N output ports, N kinds of dispersion compensating fibers 4-1 to 4-N which have dispersion compensating quantities different from each other are connected, thereby being adaptable for various transmission lines" ([0024]); and "depending on the transmission distance of the actual transmission line, the optical transmitting device needs to be provided with a dispersion compensating means such as DCF which matches the total dispersion value" ([0007]). That is, for a wavelength channel that travels a specific transmission path length, one of the dispersion values from the N dispersion compensators is the best or optimal value for that wavelength channel traveling the specific transmission path length; that is why a plurality of dispersion compensators with different dispersion values are used; and the path switch controller 7 controls the optical switch 3 to direct that wavelength channel to the dispersion compensator that is optimal or "matched" for that wavelength channel and transmission distance. That is, Konishi teaches wherein at least one of the dispersion values for a respective one of the demultiplexed wavelengths is set to an optimal value in accordance with a transmission path length at a time a transmission path is switched for the respective demultiplexed wavelength.

But, in Konishi's system, Figures 2 and 3, the switch routes one input to selected one of the dispersion compensators. Konishi does not expressly disclose to route demultiplexed wavelengths to respective output ports.

However, Tomofuji et al teaches a wavelength-selective optical switching unit (e.g., Figure 1, and 40A in Figure 14) which receives the input signal (the WDM signal to the input of the demultiplexer 10) and demultiplexes the input signal so as to output

each of the demultiplexed wavelengths at respective desired output ports while switching routes of the demultiplexed wavelengths leading to the output ports (Figure 1A, and 40A of Figure 14, the switches (11-1 to 11-2m) in the demultiplexer switch the demultiplexed signals from the demultiplexer 10, and output each of the demultipelxed signal to one of the m output ports (the output from the multiplexers 12-i etc); that is the demultiplexing section Figure 1A and 40A of Figure 14 "switching routes of the demultiplexed wavelengths leading to the output ports"). That is, by using wavelength-selective optical switching unit, each wavelength channel demultiplexed from the WDM signal can be selectively routed to respective processing unit, and all the channels can be processed or compensated by different processing unit at same time; and then combined again.

Bergano teaches a wavelength router for managing dispersion in a WDM system, and Konishi discloses a switching route to select one of the dispersion compensators so that a flexible dispersion compensation can be performed according to various dispersion characteristics of optical transmission lines, and then Tomofuji et al teaches a switching route for a WDM system so to switch the light input from a demultiplexer at a input port to be outputted from any one of the m output ports.

It is well known that the total dispersion value of a channel depends on the transmission line, distance (each channel may be added or dropped at different add/drop node) and wavelength used. Therefore, each channel may have different total dispersion value (or some channels may have similar total dispersion values), by the "active" switching, the individual channel can be sent to a specific dispersion

compensating device that matches (or be optimal to) the total dispersion value of the individual channel.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the switching route as taught by Konishi and Tomofuji et al to the system of Bergano et al so that the respective demultiplexed wavelengths can be switched to different dispersion compensators according to the characteristics of the wavelengths and transmission line, and then the system of the dispersion compensation is made much more flexible and efficient, and the dispersion of each individual channel can be precisely and efficiently compensated by optimally choosing one of the plurality of dispersion compensating devices.

2). With regard to claim 3, Bergano and Konishi and Tomofuji et al disclose all of the subject matter as applied to claim 1 above. Bergano teaches that the multiplexing unit (305 in Figure 3) receives a specific wavelength from a specific input port among the plurality of input ports (N input ports in Figure 3) and multiplexes said specific demultiplexed wavelength output by said plurality of dispersion compensation units into a signal (the output 306 in Figure 3).

But, Bergano does not disclose the details of the wavelength router; Bergano does not expressly disclose wherein said multiplexing unit multiplexes the specific demultiplexed wavelength into a plurality of demultiplexed wavelengths output by said plurality of dispersion compensation units.

However, Tomofuji et al discloses that the multiplexing unit (the multiplexing section 40B in Figure 14) which receives a specific wavelength from a specific input port

among the plurality of input ports (the m input ports to multiplexing section 40B, Figure 14) and multiplexes said specific demultiplexed wavelength into a plurality of demultiplexed wavelengths (the outputs P1, P2 ... etc., in 40B of Figure 14) output by a plurality of processing units (42-1, ..., 42-m in Figure 14).

Tomofuji et al provides a WDM optical communication system that can efficiently arrange wavelengths of optical signals of a plurality of bit rates at different wavelength spacing, and teaches an "active" switching routing controlled by a controller. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the multiplexing unit as taught by Tomofuji et al to the system of Bergano et al and Konishi so that the switching of the optical signal at different wavelengths can be made more flexible and efficient.

3). With regard to claim 4, Bergano discloses an apparatus (Figure 9) for compensating for dispersion, comprising:

an optical circulating unit (Circulator 903 in Figure 9) which includes a first port (910 in Figure 9), a second port (920 in Figure 9) and a third port (930 in Figure 9), and which receives at the first port a first signal (signal from fiber 902 in Figure 9) into which a plurality of wavelengths is multiplexed (a WDM signal is inputted; Figure 4 shows the wavelengths) so as to output from the second port the first signal (the output from 920 is input to router 904), and receives a second signal (the signal from the router 904 in Figure 9) at the second port so as to output from the third port the second signal (the signal 908 is output from the third port 930 in Figure 9);

a wavelength-selective optical routing unit (the Wavelength Router 904 in Figure 9) which receives from said second port and at one input port a signal into which said plurality of wavelengths are multiplexed and demultiplexes the signal so as to output each of the demultiplexed wavelengths at respective desired output ports (N output ports in Figure 9; each of the demultiplexed wavelengths is outputted to the respective desired output port: one of the output ports that connected to the compensation fibers 905_1-905_N) while routes of the demultiplexed wavelengths leading to the output ports; and

a plurality of dispersion compensation units (the dispersion equalizing fibers 905_1 ... 905_N in Figure 9) which are connected to the respective output ports of said wavelength-selective optical routing unit, and have respective, different dispersion compensation values (column 4 line 20-26); and

a plurality of reflecting units (the reflecting mirror 907_1 ..., 907_N in Figure 9) which reflect and return output light at end section of said respective dispersion compensation units (column 7, line 51-56).

In Figure 9, Bergano discloses wavelength router. But, Bergano does not expressly disclose a wavelength-selective optical switching route and switching routes of the demultiplexed wavelengths leading to the output ports; and wherein at least one of the dispersion compensation values for a respective one of the demultiplexed wavelengths is set to an optimal value in accordance with a transmission path length at a time a transmission path is switched for the respective demultiplexed wavelength.

However, using switching routing so that one wavelength band can be switch to any one of dispersion compensating elements specific is well known in the art. Konishi teaches a system and method (Figures 2 and 3) in which a plurality of dispersion compensators are used to compensate for various degrees of waveform distortion due to dispersion distortion in the optical transmission line by having different dispersion compensating characteristics, and a selection switch selects one of the dispersion compensators and connects the output with the selected dispersion compensator; so if the optical transmission line is changed, the dispersion compensating means such as DCF in the optical transmitting device will not have to be changed.

And Konishi discloses "[t]o the N output ports, N kinds of dispersion compensating fibers 4-1 to 4-N which have dispersion compensating quantities different from each other are connected, thereby <u>being adaptable for various transmission lines</u>" ([0024]); and "depending on the transmission distance of the actual transmission line, the optical transmitting device needs to be provided with a dispersion compensating means such as DCF which matches the total dispersion value" ([0007]). That is, for a wavelength channel that travels a specific transmission path length, one of the dispersion values from the N dispersion compensators is the best or optimal value for that wavelength channel traveling the specific transmission path length; that is why a plurality of dispersion compensators with different dispersion values are used; and the path switch controller 7 controls the optical switch 3 to direct that wavelength channel to the dispersion compensator that is optimal or "matched" for that wavelength channel and transmission distance. That is, Konishi teaches wherein at least one of the

dispersion compensation values for a respective one of the demultiplexed wavelengths is set to an optimal value in accordance with a transmission path length at a time a transmission path is switched for the respective demultiplexed wavelength.

But, in Konishi's system, Figures 2 and 3, the switch routes one input to selected one of the dispersion compensators. Konishi does not expressly disclose to route demultiplexed wavelengths to respective output ports.

However, Tomofuji et al teaches a wavelength-selective optical switching unit (e.g., Figure 1, and 40A in Figure 14) which receives at one input port the input signal (the WDM signal to the input of the demultiplexer 10) and demultiplexes the signal so as to output each of the demultiplexed wavelengths at respective desired output ports while switching routes of the demultiplexed wavelengths leading to the output ports (Figure 1A, and 40A of Figure 14, the switches (11-1 to 11-2m) in the demultiplexer switch the demultiplexed signals from the demultiplexer 10, and output each of the demultipelxed signal to one of the m output ports (the output from the multiplexers 12-i etc); that is the demultiplexing section Figure 1A and 40A of Figure 14 "switching routes of the demultiplexed wavelengths leading to the output ports"). That is, by using wavelength-selective optical switching unit, each wavelength channel demultiplexed from the WDM signal can be selectively routed to respective processing unit, and all the channels can be processed or compensated by different processing unit at same time; and then combined again.

Bergano teaches a wavelength router for managing dispersion in a WDM system, and Konishi discloses a switching route to select one of the dispersion compensators so

that a flexible dispersion compensation can be performed according to various dispersion characteristics of optical transmission lines, and then Tomofuji et al teaches a switching route for a WDM system so to switch the light input from a demultiplexer at a input port to be output from any one of the m output t ports.

It is well known that the total dispersion value of a channel depends on the transmission line, distance (each channel may be added or dropped at different add/drop node) and wavelength used. Therefore, each channel may have different total dispersion value (or some channels may have similar total dispersion values), by the "active" switching, the individual channel can be sent to a specific dispersion compensating device that matches (or be optimal to) the total dispersion value of the individual channel.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the switching route as taught by Konishi and Tomofuji et al to the system of Bergano et al so that the respective demultiplexed wavelengths can be switched to different dispersion compensators according to the characteristics of the wavelengths and transmission line, and then the system of the dispersion compensation is made much more flexible and efficient, and the dispersion of each individual channel can be precisely and efficiently compensated by optimally choosing one of the plurality of dispersion compensating devices.

4). With regard to claim 5, Bergano and Konishi and Tomofuji et al disclose all of the subject matter as applied to claim 1 above. Bergano further discloses wherein the apparatus for compensating for dispersion is provided along an optical transmission line

(Figure 1, Dispersion Equalizers 105 in provides along the optical transmission line 100, column 3 line 14-20).

5). With regard to claim 7, Bergano and Konishi and Tomofuji et al disclose all of the subject matter as applied to claim 1 above. And the combination of Bergano and Konishi and Tomofuji et al further teaches wherein the multiplexing unit (Tomofuji: the multiplexing section 40B in Figure 14) comprises a wavelength-selective optical switching unit (e.g., Figure 1B and 40B in Figure 14; the wavelength-selective optical switching unit has a plurality of switches 11-1, 11-2, ..., 11-2m) which receives at the plurality of input ports (the m input ports to the demultiplexer 12-1, ... 12-m as shown in Figures 1B and 40B in Figure 14) thereof the demultiplexed wavelengths and multiplexes said demultiplexed wavelengths so as to output the signal at the output port (the signals are multiplexed by the multiplexer 10, and a WDM signal is outputted from the multiplexer 10 shown in Figure 1B and 40B in Figure 14) while switching the routes of the demultiplexed wavelengths leading to the output port (the plurality of switches 11-1, 11-2, ..., 11-2m switches the routes of the demultiplexed wavelengths leading to the output port); and comprising:

an optical loss adjusting unit (Bergano: 307_1, 307_2, ..., 307_N in Figure 3) which variably adjusts an optical loss of the respective demultiplexed wavelengths from the respective input ports to said one output port (column 5, line 11-14).

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bergano (US 6,137,604) and Konishi (US 2001/0048540) and Tomofuji et al (WO 02/30026) as applied to claim 1 above, and in further view of Tomofuji et al (US 2002/0149818).

Bergano and Konishi and Tomofuji et al (US ‘026) disclose all of the subject matter as applied to claim 1 above. But Bergano does not teach wherein said wavelength-selective optical switching unit further includes a specific output node that is not connected to the dispersion compensation units, and outputs a specific demultiplexed wavelength from the specific output port.

However, Tomofuji et al (US ‘818) discloses an apparatus (Figures 1, 4, 14, 22 and 25) for compensating for dispersion (dispersion compensator 3 in Figures 4, 14, 22 and 25), wherein said wavelength-selective optical switching unit further includes a specific output node (e.g., the add/drop nodes 5, 6, 7 and 8 in Figures 4, 14, 22 and 25) that is not connected to the dispersion compensation units, and outputs a specific demultiplexed wavelength from the specific output port.

By making the add/drop of optical signal with the compensation node, Tomofuji et al (US ‘818) makes the add/drop function feasible along the optical transmission line. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the add/drop node as taught by Tomofuji et al (US ‘818) to the apparatus of Bergano et al and Konishi and Tomofuji et al (US ‘026) so to get a specific output node for drop function and also make the system more flexible.

8. Claims 6, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergano (US 6,137,604) and Konishi (US 2001/0048540) and Tomofuji et al (WO 02/30026) as applied to claim 1 above, and in further view of Kuwahara et al (Kuwahara et al: "Automatic dispersion equalization with simple zero dispersion detection using

alternating chirp signal in 20-Gbit/s, 400"km transmission experiment", Proc. APCC/OECC '99, October 22, 1999, Vol. 1, pages 383-386).

1). With regard to claim 6, Bergano and Konishi and Tomofuji et al disclose all of the subject matter as applied to claim 1 above. Bergano further discloses that the dispersion compensation values in each of the plurality of compensating fibers are selected so that the average chromatic dispersion of the concatenated transmission spans (104 in Figure 1) upstream from the dispersion compensator (e.g., 105 in Figure 1) and the equalizing sections are substantially returned to zero at each of the center wavelengths λ_N (column 4 line 20-26). That is, the respective dispersion compensation units have different dispersion compensation values.

But, Bergano and Konishi and Tomofuji do specifically disclose wherein the respective dispersion compensation units are set to have the dispersion compensation values at regular intervals.

However, Kuwahara et al teaches a dispersion compensation system (Figure 4), in which the respective dispersion compensation units are set to have the dispersion compensation values at regular intervals (e.g., in the first set of dispersion compensators in the SW1, the dispersion compensation values are set at the regular intervals 225 ps/nm; in the second set of dispersion compensators in the SW2, the dispersion compensation values at the regular intervals 75 ps/nm; and then the adjustable dispersion range was from 0 to +600 ps/nm, and the resolution was 75 ps/nm; page 383 left column).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the dispersion compensation values at regular intervals as taught by Kuwahara et al to the system of Bergano et al and Konishi and Tomofuji et al so that a wide range of dispersions can be compensated by the dispersion compensation units and the controlling of the switching route is made easier.

2). With regard to claim 8, Bergano and Konishi and Tomofuji et al and Kuwahara et al disclose all of the subject matter as applied to claims 1 and 6 above. And the combination of Bergano and Konishi and Tomofuji et al and Kuwahara et al further discloses an apparatus for compensating for dispersion (Bergano: Figure 3), comprising

a plurality of apparatuses for compensating for dispersion (Bergano: Figure 1), each of which has an identical structure to the apparatus for compensating for dispersion (Bergano: column 3, line 14-20, Figure 1 "shows a single period of the dispersion map consisting of optical amplifiers 103, spans of transmission fiber 104, and dispersion compensator 105. In a typical long-haul system, this series of components constituting the dispersion map period might be **repeated a number of times** over the length of the system"); and

a different dispersion compensation value, per apparatus for compensating for dispersion, which is set at regular intervals in the dispersion compensation units within each of the apparatus for compensating for dispersion (Bergano: column 4, line 20-26, the dispersion compensation values in each of the plurality of compensating fibers are selected so that the average chromatic dispersion of the concatenated transmission spans 104 upstream from the dispersion compensator 105 and the equalizing sections

202 and 205 are substantially returned to zero at each of the center wavelengths λ_N, and Kuwahara et al: Figure 4, dispersion compensation units have different dispersion compensation value set at regular intervals, e.g., 75 ps/nm).

3). With regard to claim 10, Bergano and Konishi and Tomofuji et al and Kuwahara et al disclose all of the subject matter as applied to claims 1, 6 and 8 above. And Bergano further discloses a wavelength division multiplexing communications system (Figures 1 and 3), comprising a plurality of apparatuses for compensating for dispersion at different locations along an optical transmission line, said plurality of apparatuses for compensating for dispersion being each identical to the apparatuses for compensating for dispersion (column 3, line 14-20, Figure 1 “shows a single period of the dispersion map consisting of optical amplifiers 103, spans of transmission fiber 104, and dispersion compensator 105. In a typical long-haul system, this series of components constituting the dispersion map period might be **repeated a number of times** over the length of the system”).

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bergano (US 6,137,604) and Konishi (US 2001/0048540) and Tomofuji et al (WO 02/30026) as applied to claim 1 above, and in further view of Marom et al (US 2002/0196520).

Bergano and Konishi and Tomofuji et al disclose all of the subject matter as applied to claim 1 above. But, Bergano does not expressly disclose wherein said wavelength-selective optical switching unit includes a first diffraction device which spectroscopes input light; a plurality of mirrors which switch routes of wavelengths spectroscoped by said diffraction device; and a second diffraction device which receives

from said plurality of mirrors the spectroscoped wavelengths and multiplexes the spectroscoped wavelengths.

However, Marom et al, in the same field of endeavor, discloses a programmable optical multiplexer/demultiplexer, in which the wavelength-selective optical switching unit includes a first diffraction device (grating 550 in Figure 5) which spectroscopes input light; a plurality of mirrors (560 in Figure 5) which switch routes of wavelengths spectroscoped by said diffraction device; and a second diffraction device (the grating 550 in Figure 5) which receives from said plurality of mirrors the spectroscoped wavelengths and multiplexes the spectroscoped wavelengths (page 3, [0026] and [0027]).

Marom et al provides the device for selectively multiplexing, demultiplexing and switching of optical channels in DWDM communication systems. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the wavelength-selective switching unit as taught by Marom et al to the system of Bergano et al so that the switching of the optical signal at different wavelengths can be easily controlled and the routing of the wavelengths can be made more convenient.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Soto et al (US 6,229,631) (Figures 21 and 22);

Chikuma (US 6,055,082) (optimal dispersion is chosen based on transmission distance).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Monday-Friday, 8:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Li Liu/
Examiner, Art Unit 2613
January 31, 2009